

The northernmost record of King’s Tree Iguana, *Liolaemus kingii* (Bell, 1843) (Reptilia, Liolaemidae), in Chile

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Abstract

We report the presence of *Liolaemus kingii* (Bell, 1843) in Paso Río Frías, Villa La Tapera, Lago Verde, Aysén Region, Chile. The new record extends in 201 km the distribution range of this lizard and is the northernmost record to date in Chile. We highlight the importance of systematic fieldwork in Patagonian steppe to refine estimates of the number of reptile species in the Aysén Region.

Keywords

Distribution, lizard, Patagonian Steppe, Squamata.

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Introduction

The genus *Liolaemus* Wiegmann, 1834 currently comprises at least 260 recognized species distributed across South America (Villamil et al. 2019). *Liolaemus kingii* (Bell, 1843) is a Patagonian lizard, whose type locality is Puerto Deseado, Province of Santa Cruz, Argentina. This species is included in the *kingii* group (Ceí 1986), belonging to the subgenus *Eulaemus*, section *lineomaculatus* (Olave et al. 2014). The *kingii* group includes 13 species and five candidate species (Olave et al. 2014), all present in Argentina; six of them are also present in Chile: *L. chacabucoense*, *L. escarchadosi*, *L. kingii*, *L. sarmientoi*, *L. scolaroi*, and *L. zullyae* (Veloso and Navarro 1988; Núñez and Jaksic 1992; Vidal and Labra 2008; Olave et al. 2014; Demangel 2016; Ruiz de Gamboa 2016; Mella et al. 2018). In Argentina, *Liolaemus kingii*

is widely distributed, inhabiting from northern Chubut Province to south-central Santa Cruz Province, and from the Atlantic coast to the border with Chile (Pincheira-Donoso and Núñez 2005; Breitman et al. 2013; Minoli et al. 2015), at an altitudes from 0 to 1,340 m a.s.l (Pincheira-Donoso et al. 2008).

In Chile, its presence was recently validated by Mella et al. (2018), who recorded specimens in two nearby sectors, Puerto Ingeniero Ibáñez and Paso Pallavicini, both on the north shore of General Carrera Lake (Buenos Aires Lake in Argentina). Given these antecedents, the aim of this article is to report a new record of *L. kingii* in Chile, which was found during a herpetofaunal survey in the Patagonian steppe of Aysén Region, an expansive but little-known biogeographical area with few current works on its native fauna (Mella-Romero et al. 2020).

Methods

Herpetofaunal surveys were conducted in the first week of February 2020 near of Villa La Tapera and specifically at Paso Río Frías, Chile (Fig. 1). The landscape is dominated by native Patagonian steppe, with vegetation composed primarily by members of the families Poaceae and Apiaceae (Luebert and Plischoff 2017). Observations and records of lizards were made along of transects of 200 m long, with sampling time between 30 minutes and 1.5 hours. The active sampling included the manipulation of stones, lumber, logs, and shrubs to expose hidden reptiles. The individuals were measured, photographed,

and released in the same place where they were found. Measurements were taken using Vernier calipers to the nearest millimeter. Surveys were conducted under permit RE no. 608/2020, issued by the Servicio Agrícola y Ganadero. Specimens were identified using Cei (1986), Pincheira-Donoso and Núñez (2005), Scolari (2005), and Breitman et al. (2014).

Results

Liolaemus kingii (Bell, 1843)

New records. CHILE • 1 adult ♂ (Fig. 2A, B), snout to vent length, 8.5 cm; Aysén Region, Lago Verde, Villa La

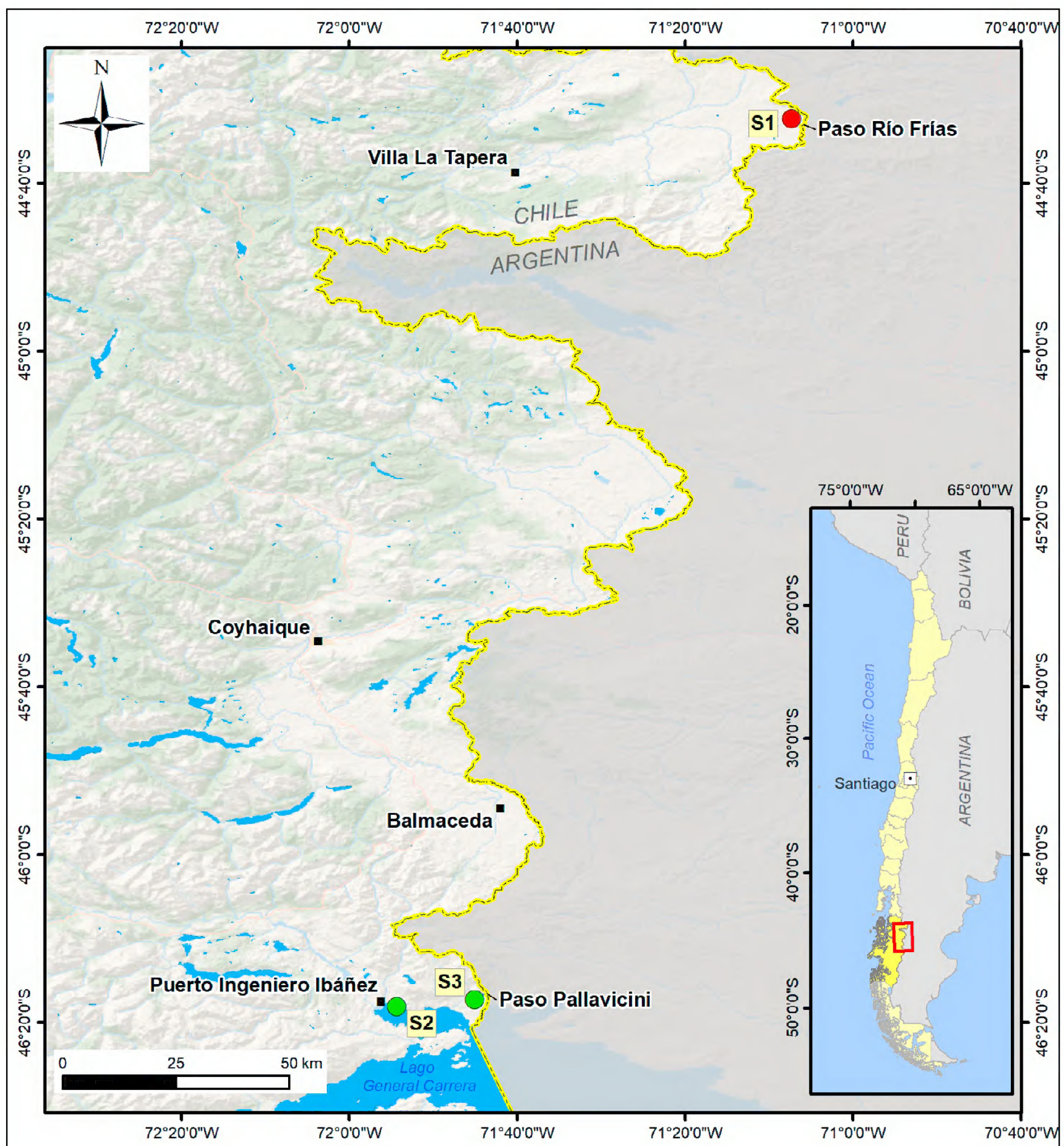


Figure 1. Distribution map of *Liolaemus kingii* in Chile. Green dots: previously known records of *L. kingii*; Puerto Ingeniero Ibáñez (S2: 46°18'08.10"S, 071°54'20.70"W) and Paso Pallavicini (S3: 46°17'20.30"S, 071°45'04.00"W) (Mella et al. 2018). Red dot: new record at Paso Río Frías (S1: 44°32'59.56"S, 071°5'53.90"W), Villa La Tapera, Aysén Region, Chile.

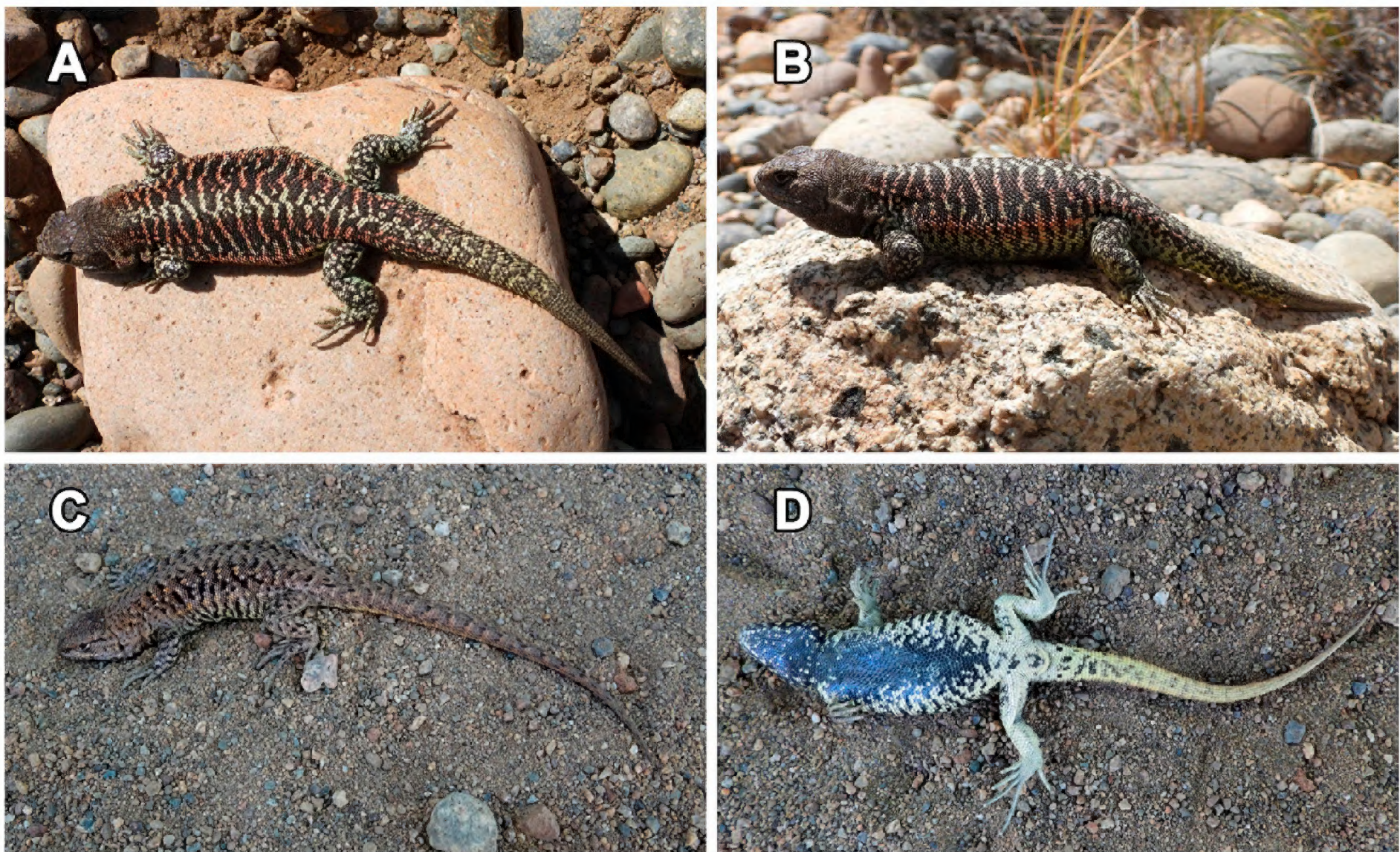


Figure 2. Individuals of *Liolaemus kingii* found in Paso Río Frías. **A.** Dorsal view of adult male, see the high-banding pattern (Scolaro and Cei 1987). **B.** Side view of adult male. **C.** Dorsal view of subadult female. **D.** Ventral view of subadult female, see the partial melanism (Scolaro and Cei 1987).

Tapera, Paso Río Frías; 44°32'59.56"S, 071°05'53.90"W; 916 m a.s.l.; 2 February 2020; photographed by Jorge Mella Ávila and Felipe Reyes Cortés; specimen found under a lumber. • 1 subadult ♀ (Fig. 2C, D), snout to vent length, 5.6 cm; Aysén Region, Lago Verde, Villa La Tapera, Paso Río Frías; 44°32'59.56"S, 071°05'53.90"W; 916 m a.s.l.; 2 February 2020; photographed by Jorge Mella-Romero and Cristián Muñoz Villouta; specimen found under a shrub of *Acaena* sp.

Identification. The specimens were identified as *L. kingii* based on the following diagnostic characteristics: (a) robust appearance; (b) brown and blackish general coloration (especially in the middle zone), with brownish head and tail; (c) 10–12 light (whitish) transverse lines, which may or may not merge in the middle zone; (d) irregular and variable lighter brown occipital band (if present); (e) yellowish belly, more pronounced in the cloacal zone, with variable black reticulation; (f) sides with light and dark crossbar pattern; (g) brown tail and limbs with light and dark body-like design; and (i) sublanceolate, keeled, imbricate dorsal scales (Cei 1986; Pincheira-Donoso and Núñez 2005; Scolaro 2005; Breitman et al. 2014; Fig. 2). These characteristics also coincide with the specimens recorded by Mella et al. (2018) from the General Carrera Lake (Puerto Ingeniero Ibáñez and Paso Pallavicini). The appearance, coloration and design pattern of this lizard differs markedly from other species recorded in this area of Chile (e.g., *Diplolaemus bibronii* Bell, 1843, *D. darwinii* Bell, 1843, *Liolaemus* cf. *lineomaculatus* Boulenger, 1885; see Mella et al. 2018, 2019).

The two morphologically similar species in Argentina are *L. baguali* Cei & Scolaro, 1983 and *L. somuncurae* Cei & Scolaro, 1981. *Liolaemus kingii* differs from *L. baguali* because the latter species presents intense ventral melanism (Cei and Scolaro 1983; Cei 1986; Scolaro and Cei 1987; Scolaro 2005), while our specimens had yellowish bellies with partial melanism (Fig. 2D). Scolaro and Cei (1987) quantified this variation in ventral melanism, with *L. baguali* close to 96% (almost totally melanic) and *L. kingii* reaching 53%. Other differences are that *L. baguali* is larger, with sharper keeled scales and longer limbs (Cei 1986; Scolaro 2005). *Liolaemus somuncurae*, in turn, presents a dorsal pattern quantified as 90% (low-banding pattern), while in *L. kingii* (Fig. 2A) this pattern reaches 36% (high-banding pattern; see Scolaro and Cei 1987). Additionally, *L. somuncurae* is smaller, slimmer, and has an almost uniformly dark dorsal pattern (Cei 1986).

Finally, these species have limited geographical distribution: *L. baguali* is restricted to an area between Pueyrredón, Cardiel, and San Martín lakes (Breitman et al. 2015), and *L. somuncurae* is recorded only from Meseta de Somuncurá (Scolaro 2005). *Liolaemus kingii*, in contrast, is widely distributed (Cei and Scolaro 1996; Scolaro 2005). The differences in their geographical distributions lends support that these are distinct species (Cei and Scolaro 1996). Moreover, the confirmed records of *L. baguali* and *L. somuncurae* are far from the border with Chile, unlike the greater proximity to the border in some localities of *L. kingii* in Argentina.

Discussion

The new records at Paso Río Frías extends the geographic distribution of *Liolaemus kingii* 201 km north of its known occurrences in Puerto Ingeniero Ibáñez and Paso Pallavicini (Mella et al. 2018). These previous two records were at 278 and 473 m a.s.l., respectively, while our new findings are at 916 m a.s.l. and expand the altitudinal distribution of the species in Chile. Based on the evidence presented here and the record documented by Mella et al. (2018), *L. kingii* is certainly found in Chile between Puerto Ingeniero Ibáñez/Paso Pallavicini in the south, and Paso Río Frías in the north, at least in the Aysén Region. The environments at these localities differ: in Puerto Ingeniero Ibáñez (S2, Fig. 1) and Paso Pallavicini (S3, Fig. 1), the habitat where *L. kingii* was found is rocky with bushes and steppe (Mella et al. 2018), while in Paso Río Frías (S1, Fig. 1; the new records), the habitat is plain with herbaceous steppe dominated by *Festuca* sp., *Azorella prolifera* (Neneo), and *Acaena* sp., without rocks (Fig. 3). Moreover, in S1 the specimens were found under wood and shrub microhabitats, while in S2 and S3 they were recorded under rocks.

The use of diverse habitats such as shrubs with rocks and steppe by *L. kingii* in Chile is consistent with the Argentine records. The distribution of *L. kingii* in Argentina is broader, from Chubut Province in the north, to Santa Cruz Province in the south (Breitman et al. 2014; Minoli et al. 2015). This wide distribution, associated with presence of this species in Subantarctic and Patagonian phytogeographic zones (Minoli et al. 2015), is a consequence of potential use of varied habitats, such as open steppes, low shrubs, and stony, sandy, and slaggy soils (Scolaro 2005). According to our field records, this species is rare and not abundant in the three sampled localities (i.e., Puerto Ingeniero Ibáñez, Paso Pallavicini, and Paso Río Frías). In Puerto Ingeniero Ibáñez and Paso Pallavicini, it was recorded at two of six samplings stations (33%), and two of 13 reptile specimens (15.4%;

Mella et al. 2018) were this species. In Paso Río Frías, it was observed in one of four sampling stations (25%), and two of the 11 reptile individuals (18.2%) were this species. *Liolaemus kingii* was sympatric with *L. bibronii* and *Diplolaemus darwini* in Puerto Ingeniero Ibáñez and Paso Pallavicini (Mella et al. 2018, 2019), while in Paso Río Frías it coexists with *Liolaemus* cf. *lineomaculatus*.

Given the presence of *L. kingii* in the Departamento de Lago Argentino (49°53'24.5"S, 072°30'16.6"W; Breitman et al. 2014), which is adjacent to the Magallanes Region of Chile, it is probable that this species inhabits this latter zone, as mentioned in Donoso-Barros and Codoceo (1962). We suggest that the IUCN Red List of Threatened Species (Avila 2016) should be updated with information from Mella et al. (2018) and our publication. Our work, and other recent studies that expand the geographic distribution of Chilean species, such as *Alsodes hugoi* Cuevas & Formas, 2001 (Correa et al. 2018), *Diplolaemus darwini* (Mella et al. 2019), and *Alsodes verrucosus* (Philippi, 1902) (Mella-Romero and Lamilla-Maulén 2019), emphasize the need of more extensive and intensive herpetological sampling, especially along the border with Argentina (e.g., Patagonian steppe). This will allow for the real geographic distributions of a great number of Chile's reptiles and amphibians to be better determined.

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Figure 3. Native Patagonian steppe. Habitat in which *Liolaemus kingii* was found in Villa La Tapera, Aysén Region, Chile.

Authors' Contributions

JMA, JMR, FRC and CMV recorded and analyzed the data, JMA and JMR wrote the text.

References

- Avila LJ (2016) *Liolaemus kingii*. The IUCN Red List of threatened species 2016: e.T56064105A56064133. <https://doi.org/10.2305/iucn.uk.2016-1.rlts.t56064105a56064133.en>
- Breitman MF, Morando M, Avila LJ (2013) Past and present taxonomy of the *Liolaemus lineomaculatus* section (Liolaemidae): is the morphological arrangement hypothesis valid? *Zoological Journal of the Linnean Society* 168 (3): 612–668. <https://doi.org/10.1111/zoj.12037>
- Breitman MF, Minoli I, Avila LJ, Medina CD, Sites JW, Morando M (2014) Lagartijas de la provincia de Santa Cruz, Argentina: distribución geográfica, diversidad genética y estado de conservación. *Cuadernos de Herpetología* 28 (2): 83–110.
- Breitman MF, Bonino MF, Sites JW, Avila LJ, Morando M (2015) Morphological variation, niche divergence, and phylogeography of Lizards of the *Liolaemus lineomaculatus* Section (Liolaemini) from Southern Patagonia. *Herpetological Monographs* 29 (1): 65–88. <https://doi.org/10.1655/herpmonographs-d-14-00003>
- Cei JM (1986) Reptiles del centro, centro-oeste y sur de la Argentina. *Herpetofauna de las zonas áridas y semiáridas. Monografía IV. Museo Regionale di Scienze Naturali di Torino, Torino*, 527 pp.
- Cei JM, Sclaro A (1983) Una nueva forma geográfica de *Liolaemus kingii* de Santa Cruz, Argentina (Lacertilia, Iguanidae). *Neotropicalia* 29 (82): 209–214.
- Cei JM, Sclaro A (1996) A new species of *Liolaemus* of the archeoforus group from the precordilleran valley of the Zeballos river, Santa Cruz Province, Argentina (Reptilia, Tropicuridae). *Bollettino del Museo Regionale di Scienze Naturali di Torino* 14 (2): 389–401.
- Correa C, Zepeda P, Lagos N, Salinas H, Palma RE, Vásquez D (2018) New populations of two threatened species of *Alsodes* (Anura, Alsodidae) reveal the scarce biogeographic knowledge of the genus in the Andes of central Chile. *Zoosystematics and Evolution* 94 (2): 349–358. <https://doi.org/10.3897/zse.94.25189>
- Demangel D (2016) Reptiles en Chile. *Fauna Nativa Ediciones, Santiago*, 619 pp.
- Donoso-Barros R, Codoceo M (1962) Reptiles de Aysén y Magallanes. *Boletín del Museo Nacional de Historia Natural* 28: 3–45.
- Luebert F, Plischoff P (2017) Sinopsis bioclimática y vegetacional de Chile. Editorial Universitaria, Santiago, 381 pp.
- Mella J, Mella-Romero J, Reyes F, Muñoz C (2018) Validación de la presencia de *Liolaemus kingii* (Bell, 1843) (Iguania: Liolaemidae) en Chile. *Boletín del Museo Nacional de Historia Natural (Chile)* 67 (2): 137–144.
- Mella J, Mella-Romero J, Reyes F, Muñoz C (2019) Ampliación de distribución geográfica de *Diplolaemus darwini* Bell, 1843 (Iguania: Leiosauridae) en Chile: registro en la región de Aysén. *Boletín del Museo Nacional de Historia Natural* 68 (1): 33–40.
- Mella-Romero J, Lamilla-Maulén P (2019) *Alsodes verrucosus* (Philippi, 1902) (Anura, Alsodidae): a new locality for a very poorly known species. *Check List* 15 (5): 811–814. <https://doi.org/10.15560/15.5.811>
- Mella-Romero J, Mella J, Reyes F, Muñoz C (2020) Registro de nado y evidencias indirectas del peludo patagónico *Chaetophractus villosus* (Desmarest, 1804) en Aysén, Chile. *Anales del Instituto de la Patagonia* 48 (1): 47–51.
- Minoli I, Morando M, Avila LJ (2015) Reptiles of Chubut province, Argentina: richness, diversity, conservation status and geographic distribution maps. *Zookeys* 498: 103–126. <https://doi.org/10.3897/zookeys.498.7476>
- Núñez H, Jaksic F (1992) Lista comentada de los reptiles terrestres de Chile Continental. *Boletín del Museo Nacional de Historia Natural* 43: 63–91.
- Olave M, Avila LJ, Sites JW, Morando M (2014) Multilocus phylogeny of the widely distributed South American lizard clade *Eulaelmus* (Liolaemini, *Liolaemus*). *Zoologica Scripta* 43 (4): 323–337. <https://doi.org/10.1111/zsc.12053>
- Pincheira-Donoso D, Núñez H (2005) Las especies chilenas del género *Liolaemus* Wiegmann, 1834 (Iguania: Tropicuridae: Liolaeminae). *Taxonomía, Sistemática y Evolución. Publicación Occasional del Museo Nacional de Historia Natural* 59: 1–486.
- Pincheira-Donoso D, Sclaro JA, Sura P (2008) A monographic catalogue on the systematics and phylogeny of the South American iguanid lizard family Liolaemidae (Squamata, Iguania). *Zootaxa* 1800 (1): 1–85. <https://doi.org/10.11646/zootaxa.1800.1.1>
- Ruiz de Gamboa M (2016) Lista actualizada de los reptiles de Chile. *Boletín Chileno de Herpetología* 3: 7–12.
- Sclaro JA (2005) Reptiles Patagónicos: Sur. Guía de campo. Ediciones Universidad Nacional de la Patagonia, Trelew, 80 pp.
- Sclaro JA, Cei JM (1987) A multivariate analysis of morphometric and exosomatic characters of iguanid lizards of the Patagonian *Liolaemus kingii* Complex. *Journal of Herpetology* 21 (4): 343–348. <https://doi.org/10.2307/1563981>
- Veloso A, Navarro J (1988) Lista sistemática y distribución geográfica de anfibios y reptiles de Chile. *Bollettino del Museo Regionale di Scienze Naturali di Torino* 6: 481–539.
- Vidal M, Labra A (2008) *Herpetología de Chile*. Science, Verlag, 593 pp.
- Villamil J, Avila LJ, Morando M, Sites JW, Leaché AD, Maneyro R, Camargo A (2019) Coalescent-based species delimitation in the sand lizards of the *Liolaemus wiegmanni* complex (Squamata: Liolaemidae). *Molecular Phylogenetics and Evolution* 138: 89–101. <https://doi.org/10.1016/j.ympev.2019.05.024>